



Center for
Clean Air Policy

Power Sector Analysis: Preliminary Base Case

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January 18, 2005

California Power Sector

- In 1999, power sector combustion emissions (57 tons) were just 13.3 percent of in-state emissions.
- CA electricity sector fuel energy consumption in 1999 (Tbtu)
 - » Coal: 0
 - » Natural gas: 146
 - » Oil: 1
- An additional 54 tons emitted out-of-state in 1999 serving California power demand.

California Power Sector

- Implications for power sector analysis:
 - » A traditional cap-and-trade program would not capture out-of-state emissions.
 - » Need to explore ways to control emissions from out-of-state power serving in-state demand.
 - » Need to look beyond power sector to industry and other stationary sources.

California Power Sector Analysis

- Using NEMS electricity market module
 - » Represents generation, transmission and pricing of electricity subject to fuel prices, other generation costs, new plant prices, and electricity demand characteristics.
 - » Plants are dispatched according to cost, considering environmental costs.
 - » Capacity additions are determined by the model.

California Power Sector Analysis

- Some limitations of NEMS:
 - » Limited ability to model technology innovation
 - » Conservative representation of energy efficiency response to higher power prices
 - » Assumes competitive power market (doesn't address market power issues)

Core Model Runs

- Reference Case
- Energy Efficiency/Renewable Energy Case(s)
- Cap on emissions associated with CA power demand (e.g., cap on load)
- Same as above, limited to investor-owned utilities
- Cap on power and industry sectors

Sensitivity Runs and Off-Line Analyses

Sensitivity Runs

- Low hydro year scenario
- Cap on load with offsets
- Different cap levels, including a cap based on intensity goals
- Climate change scenario
- Others, where needed, to match to CEC projections

Off-Line Analyses

- Offset new source emissions/existing source emissions (without a cap)
- Differences between a cap on load and emission portfolio standard



“Preliminary” Reference Case

- A reference case seeks to estimate “business as usual” emissions
 - » Uses projected levels of power demand
 - » Includes the current RPS and public goods charge
- Reference case shown today is “preliminary” because assumptions not fully vetted by the power sector workgroup
 - » Assumptions reflect discussions with CEC and comparisons b/w CEC and EIA data
- Want feedback from Advisory Committee on assumptions



Key Assumptions

- Power demand:
 - » CEC projections from 2003 IEPR extended through 2025 (CA=1.09%/y; WECC=3.09%/y)
 - » Mike Messenger's estimates of additional energy efficiency reductions from the CPUC Energy Savings Goals (2005-2008)*
- Fuel prices:
 - » Approximate preliminary regional natural gas and other fuel prices published in the Annual Energy Outlook 2005 (shown in a later slide)



* Note: The modelers approximate demand. Demand reductions used in the model are greater than the estimates provided.

Key Assumptions (2)

- Transmission (should we assume increases?)
 - » From the Northwest: 9.8 GW
 - » From the Southwest: 8.5 GW
 - » From Mexico: 0.8 GW
- Hydro Power Availability
 - » We reduced the capacity factor of “must run” plants in NEMS so that hydro generation will more closely match CEC projections. The capacities matched pretty closely between the two datasets.

Key Assumptions (3)

- Existing Plant Capacity
 - » EIA's AEO 2005 assumptions, which include planned capacity and gross capacity (CEC assumes dependable)
- New Plant Construction
 - » EIA's AEO 2005 assumptions on cost and performance characteristics for new plants
- Renewable Energy
 - » We assume the existing 20% RPS by 2017



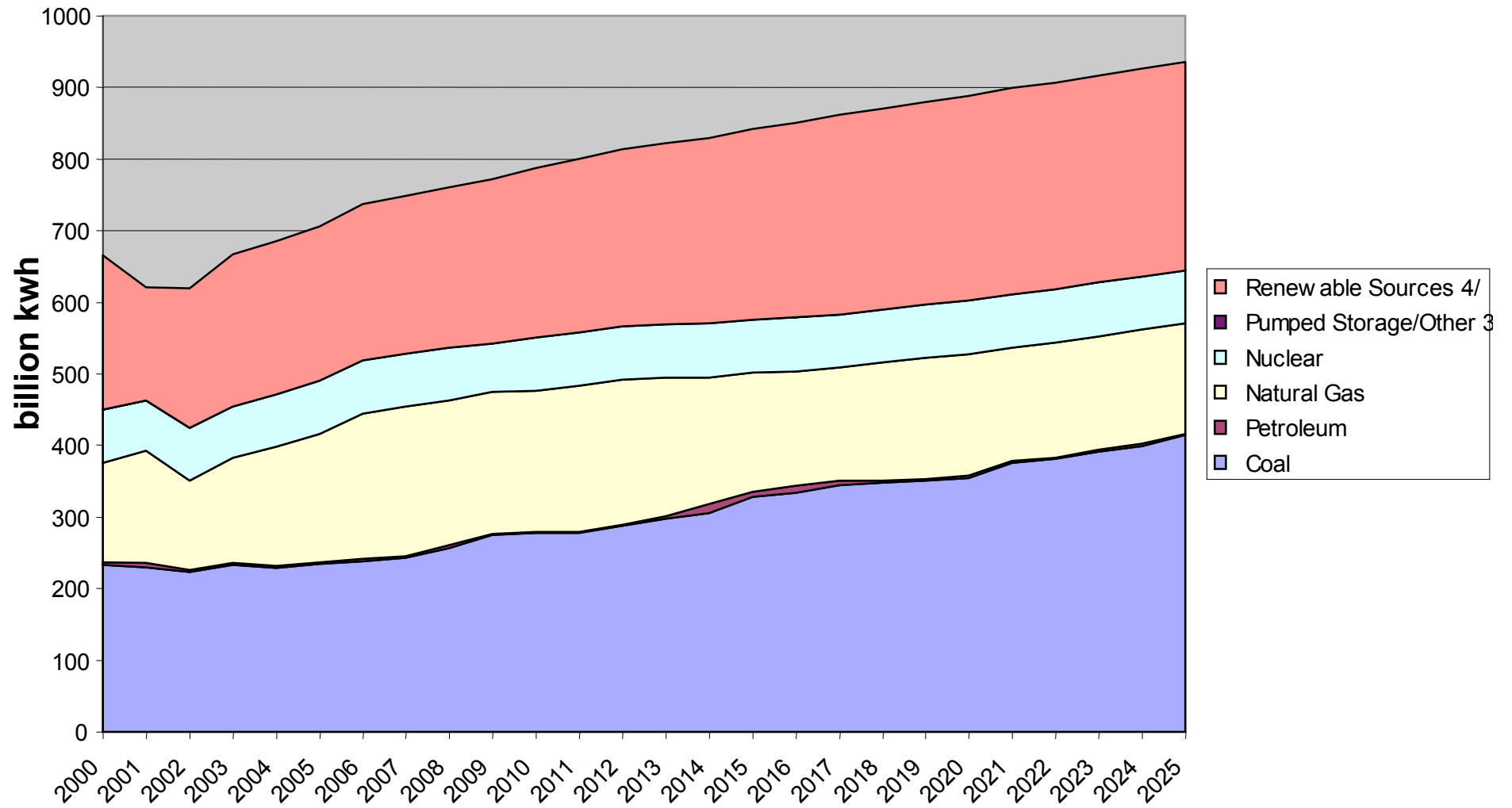
Results – Cumulative New Capacity (GW)

WECC New Builds	2010 planned	2010 unplanned	2010 total	2020 planned	2020 unplanned	2020 total
coal steam	0	5	5	0	15	15
NGCC	12	5	17	12	6	18
NGCT	2	1	3	2	10	12
RE	4	1	5	10	3	13
DG	0	0	0	0	1	1

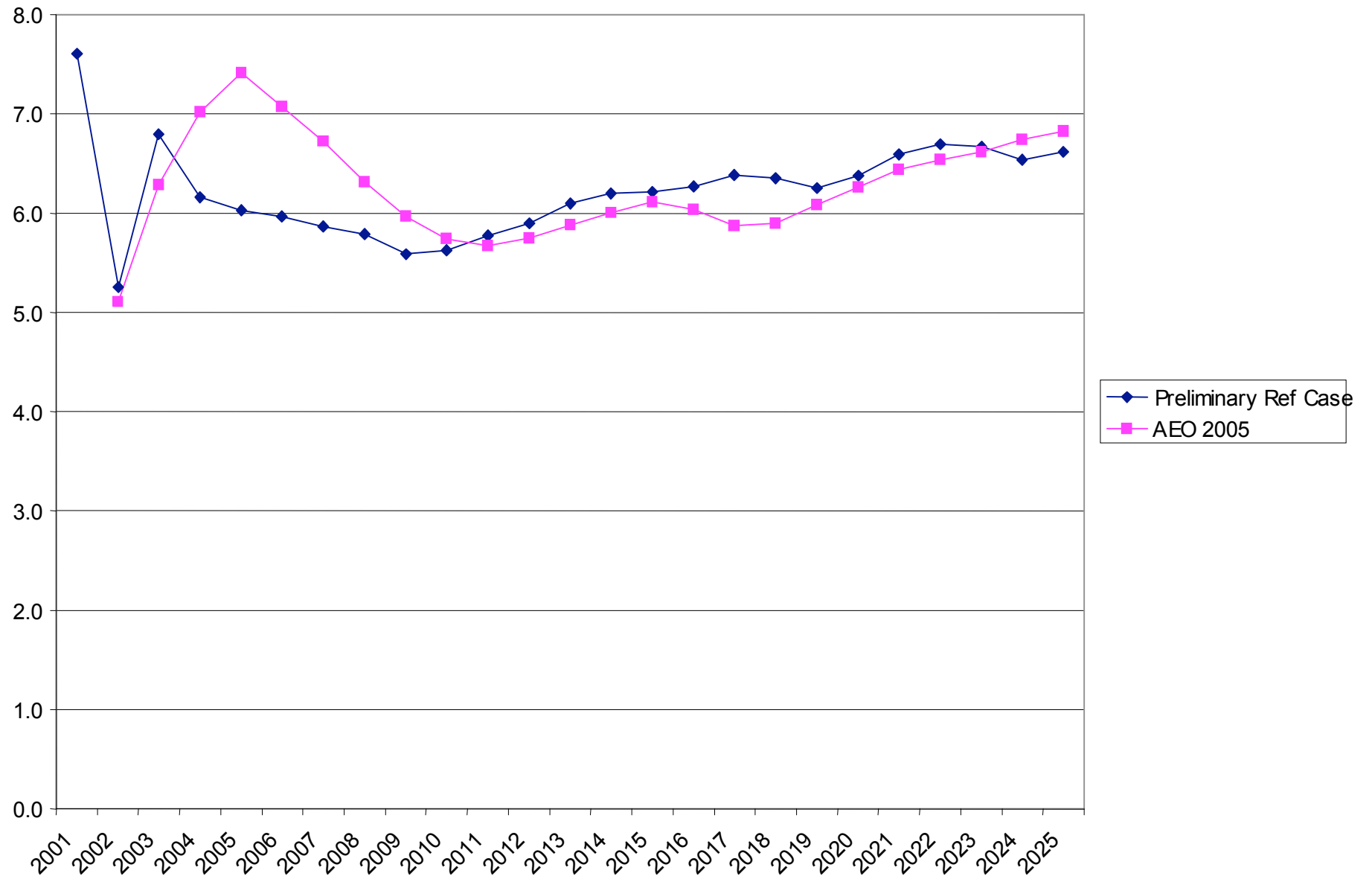
A total of 4.77 GW retire in 2010 and 6.58 GW retire in 2020, mostly “other fossil steam” and combustion turbines.



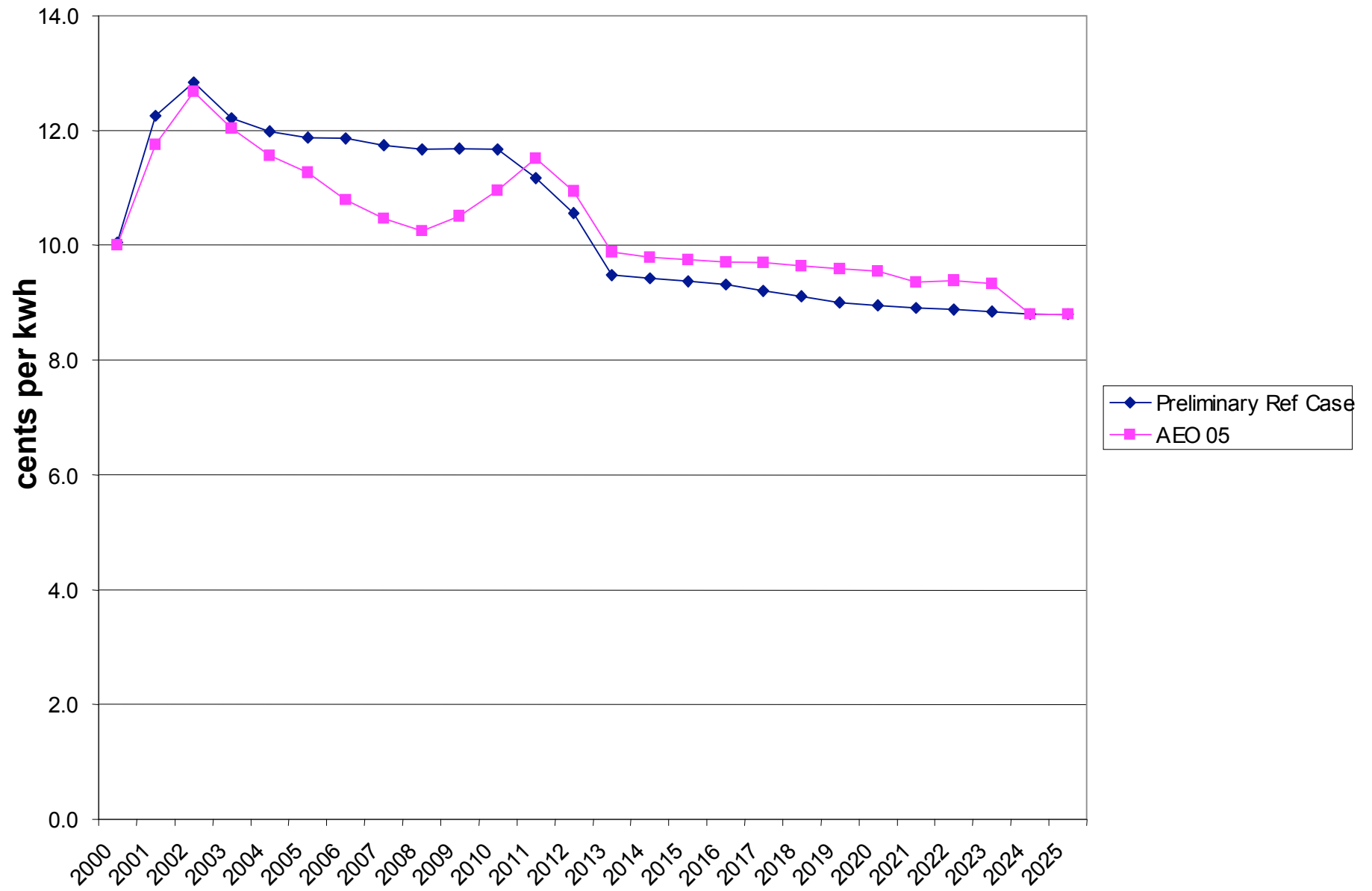
WECC Generation (2000-2025)



Natural gas prices (\$/MMBtu) (\$2003)

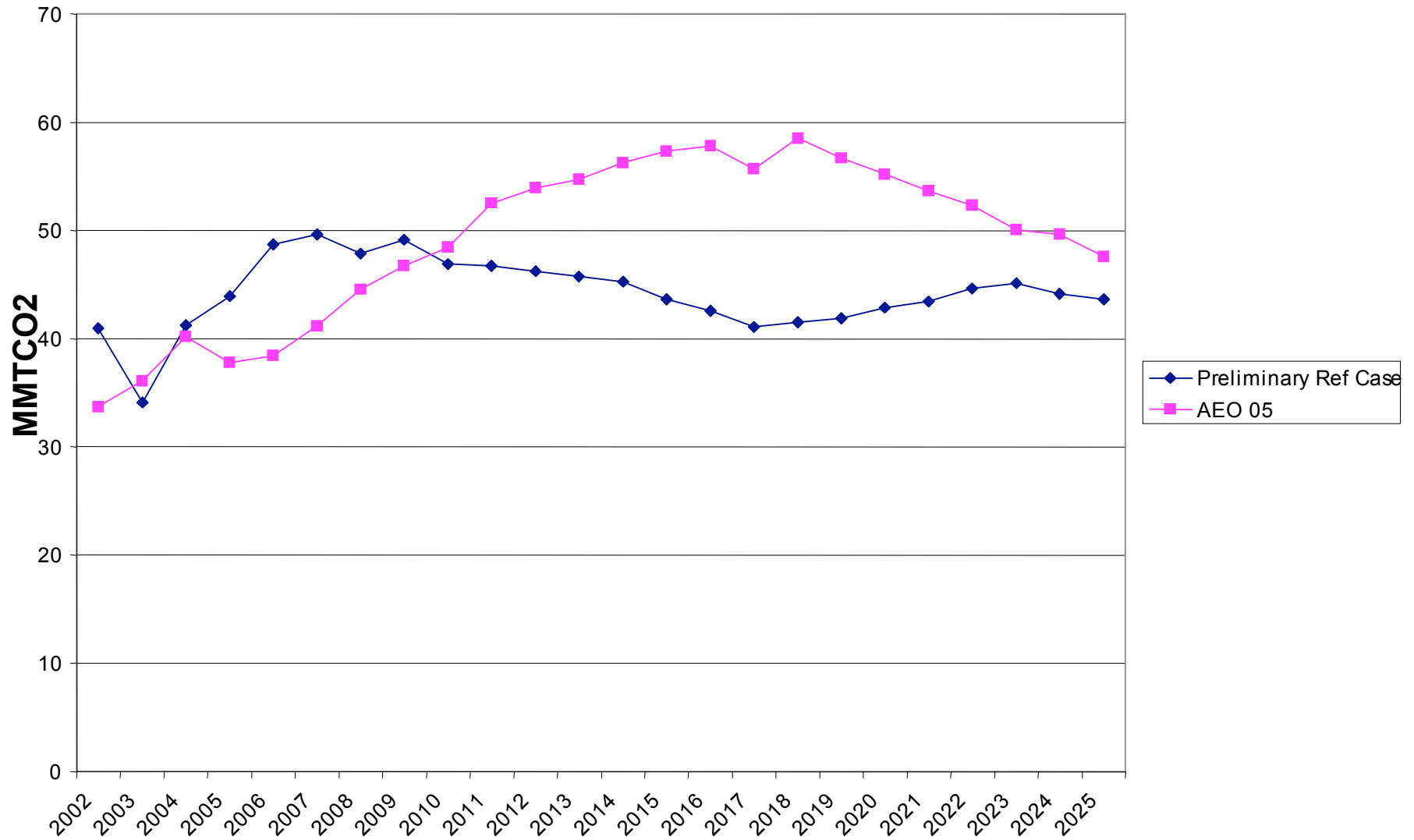


Average End User Electricity Price in California (2002-2025) \$2003



CA Power Sector CO₂ Emissions (2002-2025)

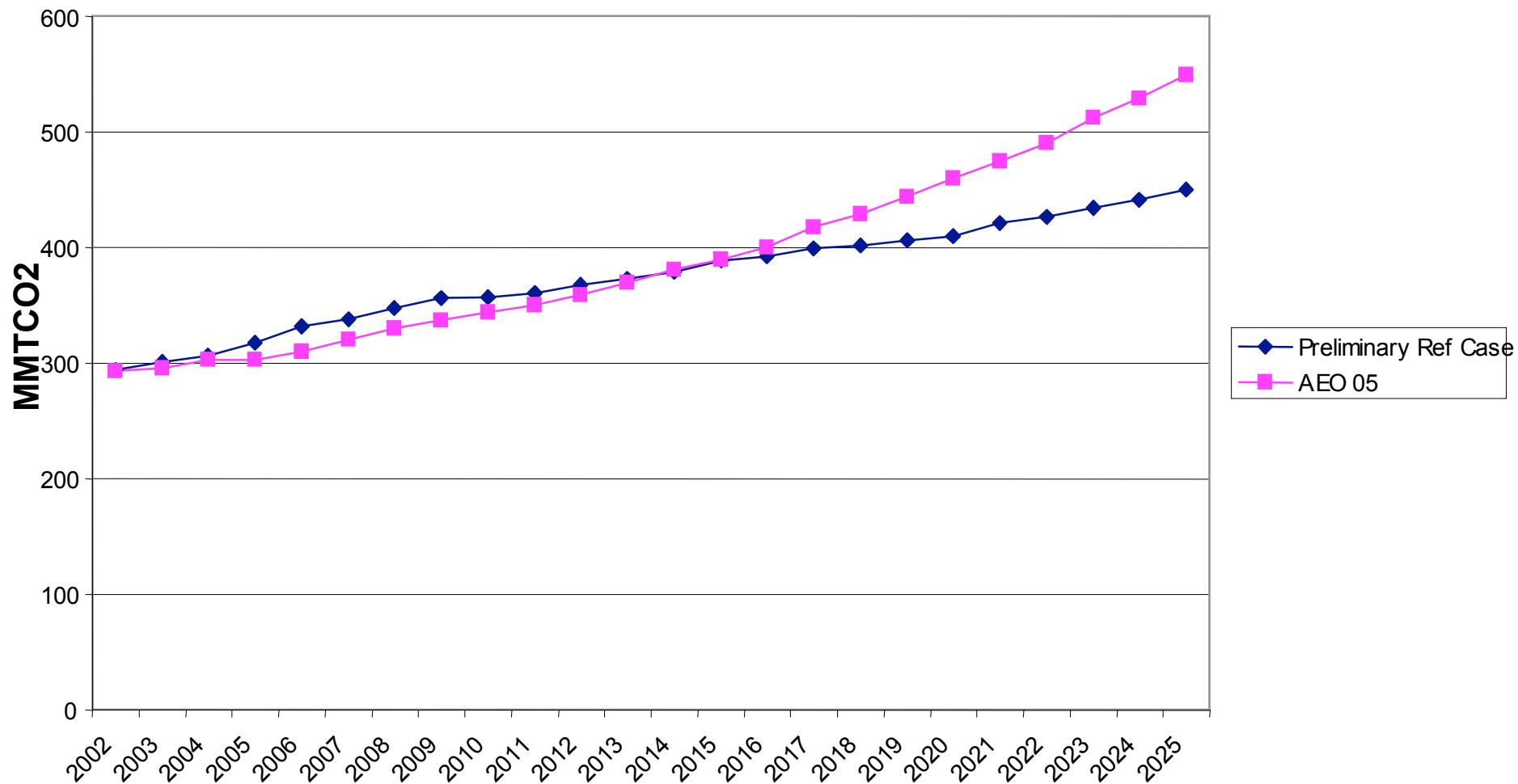
Preliminary Reference Case vs. AEO 2005



NOTE: CO₂ projections will be adjusted to enable comparison with cap on load policy runs.

WECC Power Sector CO2 Emissions (2002-2025)

Preliminary Reference Case vs. AEO 2005



Next Steps

- Finalize reference case — January/early February
- Energy efficiency and renewable energy scenario(s) — February
- Low hydro year scenario -- February
- Climate change scenario — February/March
- Other reference case sensitivity runs — February/March
- Cap scenarios to begin in April/May

